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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/673,977	09/29/2003	Zhengbai Liu	D5435	2593

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EXAMINER

ESHETE, ZELALEM

ART UNIT PAPER NUMBER

3748

DATE MAILED: 03/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/673,977

Applicant(s)

LIU, ZHENGBAI

Examiner

Zelalem Eshete

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20,22-41,43-46 and 48-52 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20,22-41,43-46 and 48-52 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

This Office Action is in response to the RCE filed on 01/20/2005.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-20,22-41,43-46,48-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komiyama et al (4,164,913) in view of Dunn et al. (4,140,096), and further in view of Garter et al. (4,270,494).

Regarding claims 1,2,22,23,43,44: Komiyama discloses an inflexible combustion/piston or a method of an diesel engine, comprising: a combustion chamber being defined intersecting a crown of the piston, the crown being orthogonally disposed to a side wall of the piston, the combustion chamber being defined by a concave surface and two convex surfaces, adjacent surfaces having direct smooth junctures (see figure 8). Komiyama further discloses post/first/second annular surfaces or a combustion chamber center portion being defined at least in part by the convex sphere to define a post, the sphere having a radius and an origin, the origin of the radius lying on a combustion chamber central axis (see figure 8); a combustion chamber second

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curved surface forming substantially a bowl bottom margin and being a concave annular surface and having an origin and a radius and being joined to the post, the second curved surface providing a minor part of the combustion chamber reentrancy (see figure 8, numeral 12); a combustion chamber third curved surface being a convex annular surface and forming a portion of a combustion chamber side margin and providing a major part of the combustion chamber reentrancy, the third curved surface having an origin and a radius and being joined to the second curved surface (see figure 8, numeral 13).

Komiyama fails to disclose a combustion chamber fourth curved surface defining the third convex annular bowl lip surface intersecting the crown of the piston and being formed free of flat surfaces.

However, Dunn teaches the third convex surface (see numeral 4). Dunn further teaches the convex annular bowl lip provides a reentrant profile (see column 4, lines 23 to 25).

Furthermore, Garter teaches combustion chamber free of flat surfaces (see figure 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify device of Komiyama by providing a third convex annular bowl lip surface as taught by Dunn in order to provide a reentrant profile as taught by Dunn. It is also would have been obvious for one having ordinary skill in the art to make such modification by providing a flat free surface as taught by Garter in order to enhance the combustion performance of the engine.

Regarding claims 4,25: Komiyama discloses a juncture between adjacent curved surfaces requires no additional surfaces to effect a smooth transition therebetween (see figure 8)

Regarding claims 5,26: Komiyama discloses the combustion chamber is symmetrical about a combustion chamber center axis (figure 8).

Regarding claims 20,48,41: Komiyama discloses the combustion chamber having a central axis, the combustion chamber central axis being coincident with a piston central axis (see figure 8).

Regarding claim 45: Komiyama as modified above discloses defining smooth surface junctures between adjacent curved surfaces, without introducing any additional bowl surfaces.

Regarding claim 46: Komiyama discloses disposing the origin of the center post on the piston central axis (see figure 8).

Regarding claims 3,24: Komiyama discloses the origin of the post is disposed on the center axis of the combustion chamber, the center axis of the combustion chamber being coaxial with the center axis of the piston (see figure 8).

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Regarding claims 6-19,27-40,49-52: Komiyama as modified above discloses the claimed invention except for numerical values of the various dimensions. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the claimed numerical values depending on the engine, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

### ***Response to Arguments***

Applicant's arguments with respect to the independent claims have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

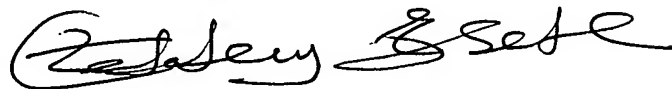
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zelalem Eshete whose telephone number is (571) 272-4860. The examiner can normally be reached on Monday to Thursday.

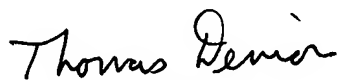
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Denion can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Zelalem Eshete  
Examiner  
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A handwritten signature in black ink, appearing to read 'Zelalem Eshete', written in a cursive style.

  
THOMAS DENION  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 3700